Myocardial infarction activates the expression of cardiometabolic biomarkers in the heart: study in a swine model.

Purpose. Inflammation, extra-cellular matrix (ECM) remodeling and adipokine system activation represent essential processes of molecular response to cardiac injury. The aim of this study was to evaluate the cardiac expression of biomarkers involved in the inflammation, ECM remodeling and adiponectin system in an experimental animal model of myocardial infarction (AMI).

Methods. Left ventricular (LV) tissue was collected from male adult pigs with AMI (n=6), induced by permanent surgical ligation of the left anterior descending coronary artery and from 6 healthy pigs. mRNA expression was determined by RT-PCR in tissue samples collected from border (BZ) and remote zones (RZ) of infarcted area. Proinflammatory cytokines (IL-6, TNF-α), matrix metalloproteinases (MMP)-2, -9, their tissue inhibitors (TIMP)-1, -2 and collagen (COL3α) were evaluated. In addition, adiponectin and its receptors, adipo-R1 and adipo-R2, were evaluated, owing its anti-inflammatory actions.

Results. This surgical approach resulted in a permanent transmural infarction affecting 10-15% of the LV wall mass and after 4 weeks the mRNA expression of biomarkers, normalized on the respective GAPDH, was significantly higher in infarcted regions than in controls (MMP-9: 7.09±4.31; 1.18±0.28; 0.72±0.11, respectively for BZ, RZ and controls, $p<0.05$ BZ vs. RZ and controls; TIMP-1: 2.41±1.20; 0.28±0.04; 0.33±0.05, $p=0.01$; TIMP-2: 2.75±1.51; 0.53±0.04; 0.38±0.03, $p<0.05$; COL3α: 4.28±1.11; 0.87±0.13; 0.61±0.18, $p<0.0004$). Inflammatory indices were increased in AMI, both BZ and RZ. Adiponectin was significantly increased with respect to controls (BZ: 2.95±1.69;

RZ: 0.93±0.33; controls: 0.52±0.12, $p<0.05$ BZ vs controls) as well as the Adipo-R1 (BZ: 1.40±0.31, RZ: 1.26±0.20, controls: 0.63±0.07; $p<0.05$ BZ and RZ vs controls).

Conclusions. The inflammatory and ECM remodelling processes are activated after myocardial injury together with the system of adiponectin, confirming its involvement in the process of cardiac remodelling/repair. The knowledge of the interaction between the various mediators of the complex response to cardiac damage could represent an important target for new therapies.

Reference. Shibata R et al, Cardiovasc Res. 2007 Jun 1;74(3):471-9.